



## **Red River Army Depot Lean Six Sigma HMMWV Vehicle Ramp-up**

The HMMWV vehicle recapitalization production ramp-up has reaped phenomenal benefits from using Lean Six Sigma. In July 2004, the HMMWV recapitalization production line was averaging three vehicles weekly and required over 400 man-hours per vehicle. In July 2004, Depot Commander Colonel Michael Cervone engaged a Lean team with an ambitious goal to meet 200 vehicles per month by June 2005

The Lean Six Sigma team was led by David Hawkins, Deputy to the Director of Operations, and Ronnie Harp, Value Stream Manager, and assisted by Simpler Consulting, Inc. They put together a team of experts to conduct the initial Value Stream Analysis with a primary goal to plan a series of week-long rapid improvement events and project activities geared towards meeting the 200-a-month target.

The Value Stream Analysis identified 13 week-long team events to meet the production goals. Nine were deemed critical and were planned immediately for completion by the end of August 2004. When the first nine team events were accomplished, the program activity was further accelerated. As a result, the target goal was reached by the December 2004, six months ahead of schedule.

A second Value Stream Analysis was conducted in December 2004 to further optimize the process. The second Value Stream Analysis created a new production goal of 18 vehicles per ten hour shift and resulted in adjusted Takt Time (the pace of production required to meet the customer demand on a one-by-one vehicle basis). By February 2005, preparatory work for the newly-designed production teardown and assembly cells was completed and the changes were implemented over a three-day weekend.

A third Value Stream Analysis was conducted on June 6, 2005, and resulted in plans to drive output to a new height of 32 vehicles per 10-hour day. As a direct result, on June 20, the HMMWV team accomplished a new one-day record by producing 21 vehicles in a 10 hour work shift! The new implementation timeline for the 32-a-day goal has a production ramp-up target date of August 28, 2005.

The ramp-up initial goal of 200 units monthly was achieved six months early. The accelerated production ramp-up also forced support groups (commodity sub-assembly area, purchased parts group and hardware supply group) to conduct Lean Six Sigma events to accelerate their output towards the goals.

Key Lean Six Sigma implementation tools used in this effort:

- Establishing standard work for each work station
- Implementing one-kit-flow to the assembly line stations

- Locating trigger points throughout the facility for supply delivery
- Instated “Waterspider” routes for trigger replenishment
- Conducted 6S events throughout the HMMWV value stream
- Establishing line balancing and manpower levels
- Moved sub-assembly operations in-line to assembly
- Posting ‘at-a-glance’ visual management tools
- Training of all involved in managing the system

The fifth principle of the Lean Six Sigma process is to strive for perfection. Evolution of the HMMWV recapitalization line ramp-up has embodied this principle. Waste removal has occurred at every juncture. The HMMWV team is developing standard work visual systems that will guarantee future success and further increases in vehicle output, while at the same time reducing the man-hours of work required to produce those vehicles.

Kudos to the dedicated mechanics, support groups, and line management who made HMMWV recapitalization a true success story!